



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/659,725

09/10/2003

Momtaz N. Mansour

T127 1010.1

3878

26158

7590

10/04/2007

WOMBLE CARLYLE SANDRIDGE & RICE, PLLC

ATTN: PATENT DOCKETING 32ND FLOOR

P.O. BOX 7037

ATLANTA, GA 30357-0037

EXAMINER

MERKLING, MATTHEW J

ART UNIT

PAPER NUMBER

1764

MAIL DATE

DELIVERY MODE

10/04/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/659,725

Applicant(s)

MANSOUR ET AL.

Examiner

Matthew J. Merkling

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-23,25-38,40-45 and 94-113 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-23,25-38,40-45 and 94-113 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Allowable Subject Matter

1. The indicated allowability of claims 24, 39, 40 and 45 is withdrawn in view of the new grounds of rejection and newly applied reference(s). Rejections based on the newly applied reference(s) follow.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Atwell (US 2,680,065).

Regarding claim 19, Atwell discloses a process for producing a product gas having heat or fuel value (col. 5 lines 73-75) comprising:

feeding a carbonaceous material (coal) to a first fluidized bed (37), the first fluidized bed containing particles suspended in a fluid medium (i.e. fluidized bed, col. 4 lines 33-43);

indirectly heating the first fluidized bed with a combustion device (52), at least a portion of the carbonaceous material being gasified to form a first product gas stream (38);

extracting bed solids containing carbon from the first fluidized bed (via conduit 46) and feeding the extracted solids to a second fluidized bed (44), the second fluidized bed being at a temperature higher than the temperature of the first fluidized bed (gas from combustion zone, 52, is fed to second fluidized bed first, and subsequently to the first fluidized bed, thus, making a higher temperature in the second fluidized bed, see diagram in Fig. 2, col. 5 lines 13-40), the second fluidized bed having a fluidizing medium comprising steam and an oxygen-containing gas (see O₂ and steam indication in Fig. 2, conduit 43), wherein:

a first portion of the extracted bed solids is oxidized in the second fluidized bed and a second portion of the extracted bed solids is endothermically converted to a gas in the second fluidized bed, to thereby form a second product gas stream (col. 4 lines 33-68).

4. Claims 19-22, 25-31, 33-37, 40-43, 45, 94-99, 101-103, 105-109, 111 and 112 are rejected under 35 U.S.C. 102(b) as being anticipated by Monacelli et al. (US 5,752,994).

Regarding claim 19, Monacelli discloses a process for producing a product gas having heat or fuel value (abstract) comprising: feeding a carbonaceous material to a first fluidized bed 54, the first fluidized bed containing particles suspended in a fluid medium (C6/L1-5); indirectly heating the first fluidized bed with a combustion device (C6/L14-20; C7/L25-30), at least a portion of the carbonaceous material being gasified to form a first product gas stream (C6/L46-59); extracting bed solids containing carbon from the first fluidized bed

and feeding the extracted solids to a second fluidized bed (recirculation, C6/L40-45), the second fluidized bed being at a temperature higher than the temperature of the first fluidized bed (C6/L30-39), the second fluidized bed having a fluidizing medium comprising steam and an oxygen-containing gas (C6/L7-20), a first portion of the carbon particles contained in the second fluidized bed is oxidized (i.e. gasification) and a second portion of the carbon particles contained in the second fluidized bed is endothermically (i.e. steam reforming) converted to a gas (C3/L39-65).

Regarding claim 20, Monacelli discloses a process as defined in claim 19, wherein the first fluidized bed is maintained at a temperature of less than about 1150 degrees F (C6/L20-25).

Regarding claim 21, Monacelli discloses a process as defined in claim 19, wherein the carbonaceous material comprises black liquor (C4/L13).

Regarding claim 22, Monacelli discloses a process as defined in claim 19, wherein the first product gas stream is fed to a filtering device for filtering solids entrained in the product gas stream, the filtered solids being recirculated back to the first fluidized bed (C6/L40-45).

Regarding claim 25, Monacelli discloses a process as defined in claim 19, wherein the portion of the carbonaceous material gasified in the first fluidized bed is endothermically converted to a gas (C3/L63-67).

Regarding claim 26, Monacelli discloses a process as defined in claim 19, wherein the fluidized bed particles contained in the first fluidized bed and the second fluidized bed comprise sodium carbonate (C1/L49-57).

Regarding claim 27, Monacelli discloses a process as defined in claim 19, wherein the second fluidized bed is heated by oxidizing carbon in the bed (C6/L21-45).

Regarding claim 28, A process as defined in claim 19, wherein the second product gas stream is filtered in order to remove entrained solids (C6/L40-46).

Regarding claim 29, Monacelli discloses a process as defined in claim 19, wherein bed solids are periodically extracted from the second fluidized bed (C6/L30-45).

Regarding claim 30, Monacelli discloses a process as defined in claim 29, wherein the re-circulated bed solids are mixed with the carbonaceous material being injected into the first fluidized bed (C6/L40-45).

Regarding claim 31, Monacelli discloses a process as defined in claim 19, wherein the first product gas stream is combined with the second product gas stream (C6/L8-51, disclosing that product gases are circulated between upper and lower beds, therefore combining the product gas streams).

Regarding claims 33, 34, 40, 42, 94-96, 101 Monacelli discloses a process for producing a product gas having heat or fuel value comprising:

feeding a carbonaceous material (black liquor, see abstract, 52) to a fluidized bed (10), the fluidized bed containing particles suspended in a fluid medium (i.e. fluidized bed, see abstract), the fluidized bed (54) including a top portion and a bottom portion, the bottom portion being in communication with a solids collection reservoir (76, see Fig. 3);

indirectly heating the fluidized bed with a combustion device (C6/L14-20; C7/L25-30), a portion of the carbonaceous material fed to the fluidized bed being gasified to form a product gas stream (C6/L46-59); and

feeding a gaseous medium through the solids collection reservoir (via conduits 2 and 3, C6/L8-20), the gaseous medium comprising an oxygen-containing gas (air, steam), the gaseous medium gasifying carbon particles that have accumulated in the bottom portion of the fluidized bed (C7/L25-30), wherein:

a first portion of the carbon particles contained in the solids collection reservoir is oxidized (i.e. gasification) and a second portion of the carbon particles contained in the solids collection reservoir is endothermically (i.e. steam reforming) converted to a gas (C3/L39-65),

wherein the solids collection reservoir being held at a temperature higher than the temperature of the fluidized bed (C6/L30-39).

Regarding claims 35, 36, 97 and 98, Monacelli discloses a process as defined in claims 33 and 94, wherein the fluidized bed is maintained at a temperature of less than about 1100 degrees F (C6/L20-25).

Regarding claims 37 and 99, Monacelli discloses a process as defined in claims 33 and 94, wherein the first product gas stream is fed to a filtering device for filtering solids entrained in the product gas stream, the filtered solids being recirculated back to the fluidized bed (C6/L40-45).

Regarding claims 41 and 102, Monacelli discloses a process as defined in claims 33 and 94, wherein the carbonaceous material comprises black liquor (C4/L13).

Regarding claims 43, 45, 103 and 105, Monacelli discloses a process as defined in claims 33 and 94, wherein the particles suspended in the fluidized bed comprise sodium carbonate (C3/L27-38) and the fluidizing medium comprises steam (C3/L46-49), the carbonaceous material being fed to the fluidized bed comprising black liquor (C3/L19-26), a majority of the black liquor being steam reformed (C3/L56-62) in the fluidized bed, and wherein a portion of the carbon particles that have accumulated in the bottom portion of the fluidized bed are oxidized (gasification, see abstract), while another portion of the carbon particles are steam reformed (C3/L57-62).

Regarding claims 106, 111 and 112 Monacelli discloses a process for producing a product gas having heat or fuel value comprising:

feeding a carbonaceous material (black liquor, see abstract, 52) to a fluidized bed (10), the fluidized bed containing particles suspended in a fluid medium (i.e. fluidized bed, see abstract), the fluidized bed (54) including a top portion and a bottom portion, the bottom portion being in communication with a solids collection reservoir (76, see Fig. 3);

indirectly heating the fluidized bed with a combustion device (C6/L14-20; C7/L25-30), a portion of the carbonaceous material fed to the fluidized bed being gasified to form a product gas stream (C6/L46-59); and

feeding a gaseous medium through the solids collection reservoir (via conduits 2 and 3, C6/L8-20), the gaseous medium comprising an oxygen-containing gas (air, steam), the gaseous medium gasifying carbon particles that have accumulated in the bottom portion of the fluidized bed (C7/L25-30), wherein:

a first portion of the carbon particles contained in the solids collection reservoir is oxidized (i.e. gasification) and a second portion of the carbon particles contained in the solids collection reservoir is endothermically (i.e. steam reforming) converted to a gas (C3/L39-65),

wherein the solids collection reservoir being held at a temperature higher than the temperature of the fluidized bed (C6/L30-39), and

wherein the particles suspended in the fluidized bed comprise sodium carbonate (C3/L27-38) and the fluidizing medium comprises steam (C3/L46-49), the carbonaceous material being fed to the fluidized bed comprising black liquor (C3/L19-26), a majority of the black liquor being steam reformed (C3/L56-62) in the fluidized bed, and wherein a portion of the carbon particles that have accumulated in the bottom portion of the fluidized bed are oxidized (gasification, see abstract), while another portion of the carbon particles are steam reformed (C3/L57-62).

Regarding claims 107 and 108, Monacelli discloses a process as defined in claim 106, wherein the fluidized bed is maintained at a temperature of less than about 1100 degrees F (C6/L20-25).

Regarding claim 109, Monacelli discloses a process as defined in claim 106, wherein the first product gas stream is fed to a filtering device for filtering solids entrained in the product gas stream, the filtered solids being recirculated back to the fluidized bed (C6/L40-45).

5. Claims 33-37 and 41-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Mansour et al. (US 5,306,481).

Regarding claim 33, Mansour discloses a process for producing a product gas having heat or fuel value comprising (C5/L1-30): feeding a carbonaceous material to a fluidized bed (31, C6/L45), the fluidized bed containing particles suspended in a fluid medium (C6/L45-57), the fluidized bed including a top portion and a bottom portion (see Fig. 6), the bottom portion being in communication with a solids collection reservoir (37, Fig. 6); indirectly heating the fluidized bed with a combustion device (3, C5/L51-60), a portion of the carbonaceous material fed to the fluidized bed being gasified to form a product gas stream (C7/L50-63); and feeding a gaseous medium (steam, etc) through the solids collection reservoir (C10/L49-53), the gaseous medium comprising an oxygen-containing gas (steam), the gaseous medium gasifying carbon particles that have accumulated in the bottom portion of the fluidized bed (C11/L1-30). Mansour further discloses a first portion of the carbon particles contained in the solids collection reservoir (bottom of fluidized bed, 31) is oxidized (gasified, see abstract) and a second portion is endothermically converted to a gas (steam reformed, see abstract).

Regarding claim 34, Mansour discloses a process as defined in claim 33, wherein the fluid medium in the fluidized bed comprises steam (C12/L6-20).

Regarding claim 35, Mansour discloses a process as defined in claim 33, wherein the fluidized bed is heated to a temperature of less than about 1150 degrees F (C17/L54-59).

Regarding claim 36, Mansour discloses a process as defined in claim 33, wherein the fluidized bed is heated to a temperature of less than about 1100 degrees F (C23/L25).

Regarding claim 37, Mansour discloses a as defined in claim 33, wherein the product gas stream is fed to a filtering device for filtering solids entrained in the product gas stream, the filtered solids being recirculated back to the fluidized bed (C19/L64-C20/L5).

Regarding claim 41, Mansour discloses a process as defined in claim 33, wherein the carbonaceous material comprises a black liquor (C17/L29).

Regarding claim 42, Mansour discloses a process as defined in claim 34, wherein at least a portion of the carbonaceous material fed to the fluidized bed is steam reformed to form the product gas stream (C1/L9-15).

Regarding claim 43, Mansour discloses a process as defined in claim 41, wherein the particles suspended in the fluidized bed comprise sodium carbonate (C17/L51).

Regarding claim 44, Mansour discloses a defined in claim 33, wherein the combustion device that indirectly heats the fluidized bed comprises a pulse combustion device (C17/34).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Tanca (US 5,624,470).

Regarding claim 23, Monacelli discloses all of the limitations of the process as defined in claim 19, and wherein the fluidizing medium fed to the second fluidized bed contains oxygen (C6/L52-60), but does not explicitly disclose in a stoichiometric amount of less than about 50% based on the amount of carbon in the bed.

Tanca discloses black liquor gasification carried out with oxygen in the range of 20-50% to result in gasification of more than 60-99% (C2/L26-45), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Monacelli to carry out the gasification reaction at stoichiometric amount of less than about 50% based on the amount of carbon in the bed for the desired resulting gasification products as such a modification is a result effective variable, where one skilled in the art would recognize to optimize a process variable by routine experimentation, for example in this case, control the

Art Unit: 1764

results of the gas produced (Tanca, C2/L25-45). See In re Boesch, 617 F.2d 272, 276 (CCPA 1980); MPEP 2144.05.

8. Claims 100 and 110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Tanca (US 5,624,470).

Regarding claims 100 and 110, Monacelli discloses all the limitations of the process as defined in claims 94 and 106 and wherein the fluidizing medium to the solids collection reservoir contains oxygen (air, steam, C6/L52-60), but does not explicitly disclose a stoichiometric amount of less than about 50% based on the amount of carbon in the bed.

Tanca discloses black liquor gasification carried out with oxygen in the range of 20-50% to result in gasification of more than 60-99% (C2/L26-45), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Monacelli to carry out the gasification reaction at stoichiometric amount of less than about 50% based on the amount of carbon in the bed for the desired resulting gasification products as such a modification is a result effective variable, where one skilled in the art would recognize to optimize a process variable by routine experimentation, for example in this case, control the results of the gas produced (Tanca, C2/L25-45). See In re Boesch, 617 F.2d 272, 276 (CCPA 1980); MPEP 2144.05.

9. Claims 44, 104 and 113 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Mansour et al. (US 5,306,481).

Regarding claims 44, 104 and 113, Monacelli discloses all the limitations of the process as defined in claims 33, 94 and 106, in which a combustion device/heat exchanger (78) is used to indirectly heat the fluidized bed. Monacelli, however, fails to teach a pulse combustion device to heat the fluidized bed.

Mansour also discloses a method and apparatus for gasifying carbonaceous materials (such as black liquor) in a fluidized bed (see abstract).

Mansour teaches resonant tubes (5) extending into the fluid-bed reactor (1) which are coupled to a pulse combustor (2) in order to provide a more efficient heat transfer mechanism between the combustion device and the fluidized bed (C11/L24-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the pulse combustor of Mansour to the combustion device/heat exchanger of Monacelli as a way to improve the efficiency of the heat transfer between the combustion device and the fluidized bed.

10. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Mansour et al. (US 5,306,481).

Regarding claim 32, Monacelli discloses all of the limitations of the process as defined in claim 19, but does not disclose wherein the combustion device that indirectly heats the first fluidized bed comprises a pulse combustion device.

Art Unit: 1764

Mansour discloses black liquor gasification process utilizing a pulse combustor to indirectly heat the first fluidized bed, and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Monacelli with Mansour for the purpose to provide enhanced reaction rates in the fluidized bed resulting from heat transfer (C4/L48-57).

11. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mansour et al. (US 5,306,481), in view of Tanca (US 5,624,470).

Regarding claim 38, Mansour discloses all of the limitations of the process as defined in claim 33, but does not wherein the gaseous medium fed through the solids collection reservoir contains oxygen in a stoichiometric amount less than about 50%.

Tanca discloses black liquor gasification carried out with oxygen in the range of 20-50% to result in gasification of more than 60-99% (C2/L26-45), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mansour to carry out the gasification reaction at stoichiometric amount of less than about 50% based on the amount of carbon in the bed for the desired resulting gasification products as such a modification is a result effective variable, where one skilled in the art would recognize to optimize a process variable by routine experimentation, for example in this case, control the results of the gas produced (Tanca, C2/L25-45). See In re Boesch, 617 F.2d 272, 276 (CCPA 1980); MPEP 2144.05.

Response to Arguments

12. Applicant's arguments filed on 7/24/07 have been fully considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Merkling whose telephone number is (571) 272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



MJM



GLENN A. CALDAROLA
PRIMARY EXAMINER
GROUP 1100
101700